In re Appln. Of: Sascha Nick
Application No.: 09/934,000

REMARKS

The Office Action dated December 21, 2004 and the cited reference have been carefully reviewed. Claims 1-19 remain pending and are at issue.

35 U.S.C. §102 Rejections

It is axiomatic in the patent law that to reject a claim under 35 U.S.C. §102, each and every limitation must be found, expressly or inherently, in a single reference and arranged as required by the claims such that the reference discloses the identical invention. *See* MPEP § 2131. Anticipation is not established if in reading a claim on something disclosed in a reference it is necessary to pick, choose, and combine various portions of the disclosure not directly related to each other by the teachings of the reference. See *Ex parte Beuther*, 71 USPQ2d 1313 (BdPatApp&Int 2003), citing *In re Arkley*, 172 USPQ 524, 526 (CCPA 1972). A reference applied as anticipatory of the claimed invention under 35 U.S.C. §102 must be enabling so as to place one of ordinary skill in the art in possession of the claimed invention. *See* Akzo N.V. v. United States Int'l Trade Commission, 808 F.2d 1471, 1479, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986) cert. denied, 482 U.S. 909, (1987); *In re* Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990).

The Office Action has rejected claims 1-19 under 35 USC 102(e) as being anticipated by Wegerich et al. (U.S. Patent No. 6,202,038). This ground of rejection is respectfully traversed. Reconsideration of this rejection in view of the following comments is respectfully solicited.

It is respectfully submitted that Wegerich '038 does not disclose, explicitly or inherently, the invention claimed by claims 1 -19, and therefore cannot anticipate these claims because it fails to teach each and every limitation required by these claims as is required by 35 U.S.C. §102 and explained below.

With respect to claim 1, claim 1 requires, *inter alia*, the steps of transmitting information describing each anomaly to a location remote from the machine and diagnosing at the remote location the information describing the anomaly, where the diagnosis includes an initial analysis of the information by diagnostic tools maintained at the remote location, a subsequent analysis of the information by diagnostic tools maintained elsewhere if the initial analysis fails to provide a diagnosis and a final analysis by a team of humans aided by a collaborative environment if the initial and subsequent analyses fails to provide a diagnosis. The Office Action states that Wegerich '038 teaches these steps and refers to column 10, lines 6-20 and column 12, lines 1-25 of Wegerich '038 for support of these statements.

The Examiner is directed to FIGs. 1 and 2 and generally paragraphs 0030 to 0035 and paragraphs 0044 to 0055 of the present invention where it can be seen that anomalies are identified locally with respect to the machine's location by a detector. Sensor data is transmitted over a network to an OEM server via a proxy/gateway while the detector continues to monitor the machine. The OEM server hosts an expert system that includes a component pattern library and a systemic pattern library. The OEM compares the sensor data with known systemic patterns as diagnosed by human experts and, if a match is found, sends an action alert to the party responsible for operation with a recommended action. If no match is found, the data is compared with known component failures and, if a match is found, sends an action alert to the party responsible for operation with a recommended action. If no systemic or component pattern matches, the data is sent to other OEM servers maintained elsewhere to determine if other OEM servers can match the sensor data to systemic or component pattern matches the other OEM servers have in their libraries and the above process repeats. If no match is found, an expert network server receives the sensor data and determines which human experts to use to provide a solution. The solution is then sent to the party responsible for operation.

Wegerich '038 teaches a method of for monitoring a source of data for determining an operating state of a working system that uses different tests methodologies based on the number of sensors being used. If only a single sensor is used, Wegerich '038 teaches that a sequential probability ratio test (SPRT) is used. If a pair of sensors is used, Wegerich '038 teaches that a regression SPRT procedure is used if the signals are linearly or non-linearly related. If multiple sensors are used, Wegerich '038 teaches that a bounded angle ratio test is used. The above methods are used to accumulate sensor signals and determine the operating state of the system. Col. 10, lines 6-20 of Wegerich '038 teach that known functional relationships are used between process variables in the regression SPRT to detect the onset of system or sensor failure and that the SPRT procedure reduces the probability of a false alarm. Col 12, lines 1-25 of Wegerich '038 teach an illustration of a preferred form of bivariate regression SPRT based on an EBR-II nuclear reactor referenced in Wegerich '038. In the illustration, two temperature sensors were used and a regression lines for 24 minutes of data during normal operation was specified and the predicted temperature was compared to the actual temperature by taking a regression-based difference in the regression SPRT taught by Wegerich '038. The results were then compared to a prior art SPRT test and subsequent lines and columns of Wegerich '038 discuss the results and comparison.

Wegerich '038 has been thoroughly reviewed and no teaching or suggestion could be found to perform the steps of transmitting information describing each anomaly to a location remote from the machine and diagnosing at the remote location the information describing the anomaly, where the diagnosis includes an initial analysis of the information by diagnostic tools maintained at the remote location, a subsequent analysis of the information by diagnostic tools maintained elsewhere if the initial analysis fails to provide a diagnosis and a final analysis by a team of humans aided by a collaborative environment if the initial and subsequent analyses fails to provide a diagnosis.

Therefore, Wegerich '038 does not teach or suggest all of the elements of claim 1. In view of the foregoing, it is respectfully requested that the rejection of claim1 be withdrawn.

Claims 2-6 depend from claim 1 and are believed to be patentable for the same reasons set forth above for claim 1. It is therefore respectfully requested that the rejection of claims 2-6 be withdrawn.

With respect to claim 7, claim 7 requires, *inter alia*, a local tool positioned proximate a machine that analyzes information from sensors monitoring the machine to determine if the information fits within normal operation of the machine, that generates an exception report when the information does not fit the model, and that sends the exception report via an interface to a communications link to a remote diagnostic tool for diagnosis that is connected to the tool via the communications link.

The Examiner is directed to paragraph 0043 and subsequent of the present application. The local tool (e.g., detector 302) maintains an incident archive and a context archive. The incident archive contains one FFT (Fast Fourier Transform) per minute for two hours in one embodiment and cyclically rewritten to conserve memory and/or storage space. Prior to deletion one FFT per hour is moved into the context archive and kept for a period of time. In the event that the sensor data does not fit the model, the incident archive and the context archive are transmitted to an OEM server (e.g., a remote diagnostic tool) for diagnosis.

The Office Action states that Wegerich '038 teaches in the abstract, column 5, lines 64-67 and column 6, lines 10-15 the local tool as claimed and column 10, lines 6-20 of Wegerich '038 teach the interface to the communications link for sending the exception report to the remote diagnostic tool for diagnosis.

The abstract of Wegerich '038 indicates that Wegerich '038 teaches a method of for monitoring a source of data for determining an operating state of a working system that uses different tests methodologies based on the number of sensors being used. If only a single sensor is used, Wegerich '038 teaches that a sequential probability ratio test (SPRT) is used.

If a pair of sensors is used, Wegerich '038 teaches that a regression SPRT procedure is used if the signals are linearly or non-linearly related. If multiple sensors are used, Wegerich '038 teaches that a bounded angle ratio test is used. The above methods are used to accumulate sensor signals and determine the operating state of the system. Column 5, lines 64-67 of Wegerich '083 teach that a MONOSPRT approach as described in column 6, line 1 to column 9, line 49 is used for monitoring a system if the system only has a single sensor. Column 6, lines 10-15 of Wegerich '038 teach that in a first preferred embodiment (MONOSPRT) involving surveillance and analysis of systems having only one source of signals or data, such as, non-safety grade nuclear reactors and many industrial, biological and financial processes, a highly sensitive methodology implements a sequential analysis technique when the decision process is based on a single, serially correlated stochastic process.

Column 10, lines 6-20 of Wegerich '038 teach that in the regression SPRT method of Wegerich '038, "known functional relationships are used between process variables in a SPRT type of test to detect the onset of system or sensor failure. The approach reduces the probability of false alarms while maintaining an extremely high degree of sensitivity to subtle changes in the process signals. For safety- or mission-critical applications, a reduction in the number of false alarms can save large amounts of time, effort and money due to extremely conservative procedures that must be implemented in the case of a failure alarm. For example, in nuclear power applications, a failure alarm could cause the operators to shut down the reactor in order to diagnose the problem, an action which typically costs the plant a million dollars per day."

Wegerich '038 has been thoroughly reviewed. No teaching or suggestion could be found of a local tool positioned proximate a machine that analyzes information from sensors monitoring the machine to determine if the information fits within normal operation of the machine, that generates an exception report when the information does not fit the model, and that sends the exception report via an interface to a communications link to a remote diagnostic tool for diagnosis that is connected to the tool via the communications link.

Therefore, it is respectfully submitted that Wegerich '038 does not teach or suggest all of the limitations of claim 7. In view of the foregoing, it is respectfully requested that the rejection of claim 7 be withdrawn.

Claims 8-11 depend from claim 7 and are believed to be patentable for the same reasons as set forth above for claim 7. It is therefore respectfully requested that the rejection of claims 8-11 be withdrawn.

Independent claim 12 requires, *inter alia*, a remote diagnostic tool having a first node on a communications link for diagnosing an anomaly detected by a local tool proximate a

machine and instructions for diagnosing the anomaly using diagnostic tools available at the node, additional nodes on the network having access to additional diagnostic tools, and instructions at the first node for communicating the anomaly to one of additional nodes via an interface if the diagnostic tools available at the first node are unable to provide a diagnosis of a cause of the anomaly.

The Office Action states that column 12, lines 1-25 of Wegerich '038 teaches a diagnostic tool located remotely from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors the operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a first node on the communications link for diagnosing the anomaly detected by the local tool and instructions for diagnosing the anomaly using diagnostic tools available at the node; that column 3, lines 30-45 of Wegerich '038 teach additional nodes on the network having access to additional diagnostic tools and an interface between the first node and the additional nodes for communicating the anomaly from the first node to the additional nodes; and that column 9, lines 23-40 of Wegerich '038 teach instructions at the first node for communicating the anomaly to one of the additional nodes if the diagnostic tools available at the first node are unable to provide a diagnosis of a cause of the anomaly.

It is respectfully submitted that the Office Action is improperly picking, choosing, and combining various portions of the disclosure not directly related to each other by the teachings of the reference because of jumping from column 12 of Wegerich '038 back to column 3 of Wegerich '038 and then to column 9 of Wegerich '038. In particular, column 3, lines 30-45 of Wegerich '038 merely states objectives of the invention, column 12, lines 1-25 teaches portions of a regression SPRT method, and column 9, lines 23-40 of Wegerich '038 teach the results of an example of a different SPRT method that is not related to the regression SPRT method taught in column 12, lines 1-25 of Wegerich '038.

Furthermore, column 12, lines 1-25 of Wegerich '038, as previously described, teach an illustration of a preferred form of bivariate regression SPRT based on an EBR-II nuclear reactor referenced in Wegerich '038. In the illustration, two temperature sensors were used and a regression lines for 24 minutes of data during normal operation was specified and the predicted temperature was compared to the actual temperature by taking a regression-based difference in the regression SPRT taught by Wegerich '038. The results were then compared to a prior art SPRT test and subsequent lines and columns of Wegerich '038 discuss the results and comparison. This does not teach or suggest a diagnostic tool located remotely

from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors the operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a first node on the communications link for diagnosing the anomaly detected by the local tool and instructions for diagnosing the anomaly using diagnostic tools available at the node No teaching or suggestion could be found in Wegerich '038 of a diagnostic tool located remotely from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors the operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a first node on the communications link for diagnosing the anomaly detected by the local tool and instructions for diagnosing the anomaly using diagnostic tools available at the node.

Column 9, lines 23-40 of Wegerich '038 teach results of applying the MONOSPRT embodiment of Wegerich '038 to a sinusoid containing no disturbance, as step disturbance, and a linear drift with a signal-to-noise ratio of 0.5 and a sample failure magnitude set to 1.5 and applying the MONOSPRT embodiment to an actual sensor signal from a primary pump of the ERB-II nuclear reactor at Argonne National Laboratory. This does not teach or suggest instructions at a first node for communicating an anomaly of a machine's operating condition to one of additional nodes if the diagnostic tools at the first node are unable to provide a diagnosis of a cause of the anomaly. No teaching or suggestion could be found in Wegerich '038 of instructions at a first node for communicating an anomaly of a machine's operating condition to one of additional nodes if the diagnostic tools at the first node are unable to provide a diagnosis of a cause of the anomaly.

From the foregoing, it is respectfully submitted that Wegerich '038 does not teach or suggest all of the limitations of claim 12. Therefore, Wegerich '038 cannot anticipate claim 12. In view of the foregoing, it is respectfully requested that the rejection of claim 12 be withdrawn.

Claims 13-15 depend from claim 12 and are believed to be patentable for the same reasons set forth with respect to claim 12. With respect to claims 13 and 14, the SPRT methodologies of Wegerich '038 determine if a signal is within normal parameters. No teaching or suggestion could be found in Wegerich '038 of any of the test methodologies of Wegerich '038 have or use pattern matching libraries used to diagnose a machine or pattern matching libraries that include libraries for matching systemic and component operating conditions. With respect to claim 15, no teaching or suggestion could be found in Wegerich

'038 of instructions for communicating an anomaly to an expert system supported by human interaction for diagnosing the anomaly when the diagnostic tools of the nodes fail to provide a diagnosis. In view of the foregoing, it is respectfully requested that the rejection of claims 13-15 be withdrawn.

Independent claim 16 requires, *inter alia*, a diagnostic tool located remotely from a machine that has a library of patterns that has information describing system anomalies and a library of patterns having information describing component anomalies where the diagnostic tools use the libraries in succession to diagnoses the anomaly.

The Examiner is directed to FIG. 5 and the associated text of the present application where it teaches that the OEM server compares the sensor data with known systemic patterns in the systemic pattern library using a model of systemic behavior to determine if there is a match between the sensor data and a specific failure pattern in the systemic pattern library and if there is a match, provide a diagnosis in the form of an action alert to the party responsible for the maintenance of the machine so that appropriate action can be taken. If no match is found, the data is compared with known component patterns in the library of information describing component anomalies. If there is a match, a diagnosis in the form of an action alert is provided to the party responsible for the maintenance of the machine so that appropriate action can be taken. If there is no match to the libraries, the data is sent to other tools with similar libraries to determine if the other tools can diagnose the anomaly. If the other tools cannot diagnose the anomaly, the data is sent to one or more human experts working in a collaborative environment to diagnose the cause of the anomaly.

The Office Action states that column 12, lines 1-25 of Wegerich '038 teach a diagnostic tool located remotely from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a node on the communications link diagnosing the anomaly detected by the local tool; and that column 3, lines 30-45 of Wegerich '038 teach the libraries having information describing system anomalies and component anomalies.

Column 12, lines 1-25 of Wegerich '038, as previously described, teach an illustration of a preferred form of regression SPRT based on an EBR-II nuclear reactor referenced in Wegerich '038. In the illustration, two temperature sensors were used and a regression lines for 24 minutes of data during normal operation was specified and the predicted temperature was compared to the actual temperature by taking a regression-based difference in the

regression SPRT taught by Wegerich '038. The results were then compared to a prior art SPRT test and subsequent lines and columns of Wegerich '038 discuss the results and comparison. This does not teach or suggest a diagnostic tool located remotely from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors the operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a node on the communications link for diagnosing the anomaly detected by the local tool. No teaching or suggestion could be found in Wegerich '038 of a diagnostic tool located remotely from a machine that provides a diagnosis of an anomaly of the machine's operating conditions, where the diagnostic tool is connected via a communications link to a local tool that is located proximate the machine, and the local tool monitors the operating conditions of the machine and identifies the anomalies, the remote diagnostic tool comprising: a node on the communications link for diagnosing the anomaly detected by the local tool.

Column 3, lines 30-45 of Wegerich '038 state that an object of Wegerich '038 utilizes at least one of a single signal analytic technique, a two unique signal source technique, and a bounded angle ratio test. As previously indicated, a reference applied as anticipatory of the claimed invention under 35 U.S.C. §102 must be enabling so as to place one of ordinary skill in the art in possession of the claimed invention. A mere statement of an object in a summary of the invention is not enabling. Furthermore, the single signal analytic technique (the MONOSPRT method of Wegerich '038 – column 6, line 10 to column 9, line 49), the two unique signal source technique (the regression SPRT method of Wegerich '038 – column 9, line 50 to column 13, line 51), and the bounded angle ratio test (the BART method of Wegerich '038 – column 13, line 52 to column 17, line 50) are used only to identify a deviation in a signal compared to normal values and provide an indication if there is a deviation. They do not diagnose an anomaly. Nor do they teach using a library of patterns comprising information describing system anomalies or a library of patterns having information describing component anomalies.

From the foregoing, it is respectfully submitted that Wegerich '038 does not teach or suggest all of the elements of claim 16. It is therefore respectfully requested that the rejection of claim 16 be withdrawn.

Claim 17 depends from claim 16 and is believed to be patentable for the same reasons set forth above for claim 16. Additionally, no teaching or suggestion could be found in Wegerich '038 of human experts working in a collaborative environment to diagnose the cause of the anomaly as required by claim 17. Claims 18 and 19 depend from claim 17 and

are believed to be patentable for the same reasons as set forth above for claim 17. Additionally, no teaching or suggestion could be found of another node having instructions for diagnosing the anomaly that receives the anomaly when a first node fails to diagnose the anomaly. Therefore, it is respectfully submitted that Wegerich '038 does not teach or suggest all of the elements of claims 17-19. In view of the foregoing, it is respectfully requested that the rejection of claims 17-19 be withdrawn.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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